Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Obstetrics and Gynecology Research

Journal homepage: www.ijogr.org

Original Research Article

# Evaluation of serum lactate dehydrogenase as early diagnostic biomarker in pregnancy with preeclampsia and eclampsia

**Lavanya B[1,*], Rashmi Ullagaddi[2], Pavani M[3], K Srinivas Rao[4]**

[1]*Dept. of Obstetrics & Gynaecology, Shyam Shah Medical College, Rewa, Madhya Pradesh, India*
[2]*Dept. of Reproductive Medicine & Surgery, Kasturba Medical College, Manipal, Karnataka, India*
[3]*Dept. of Obstetrics & Gynaecology, Navodaya Medical College, Raichur, Karnataka, India*
[4]*Dept. of Biochemistry, Navodaya Medical College, Raichur, Karnataka, India*

ARTICLE INFO

*Article history:*
Received 05-11-2021
Accepted 08-11-2021
Available online 14-02-2022

*Keywords:*
Preeclampsia
Eclampsia
Serum lactate dehydrogenase

ABSTRACT

**Background:** Pregnancy is a physiological state associated with many alterations in biochemical, physiological, hematological & immunological processes. Preeclampsia and eclampsia complicate 6-8% of all pregnancies and lead to various maternal and fetal complications. The aim of the present study was to evaluate serum LDH levels in the normal pregnant women and pregnant women with preeclampsia and eclampsia in ante-partum period and to study the correlation of maternal and perinatal outcomes with serum LDH levels.

**Methodology:** This prospective study was conducted among ANC mothers from 18-35 years with term singleton pregnancy attending OBG OPD and labour room at Navodaya Medical College Hospital & Research Centre, Raichur. After taking informed consent & detailed clinical examination, relevant laboratory investigations were performed. The serum LDH estimated using fully automated ERBA biochemical analyser.

**Results:** In the present study, a total of 200 pregnant women were included, out of which 100 were normal pregnant women which served as control group; remaining 34 (17%) cases were included in pregnancy with eclampsia and 66 (33%) were pregnancy with pre-eclampsia. In 29 cases of study group with Serum LDH in the range of 600-800 IU/L, 08 (27.6%) had severe pre-eclampsia and 18 (62.0%) had eclampsia. Of 34 eclampsia cases, 18(52.9%) had Serum LDH range 600-800IU/L and 14 (41.2%) had serum LDH >800IU/L. The mean Serum LDH in study group was 570.5 IU/L and in control group was 201.5 IU/L. The patients had maternal complications like abruption, PPH, DIC, eclampsia with LDH>600. Neonatal complications like IUGR, fetal distress, neonatal death, LBW, premature birth, IUD were increased with raised LDH.

**Conclusion:** Serum LDH is the earliest marker in blood during hypoxia and oxidative stress. It is raised in cases of pre-eclampsia and eclampsia. Detection of high-risk patients with increased levels of LDH mandates close monitoring, prompt and correct management to decrease both maternal and foetal morbidity and mortality. Estimation of serum Lactate Dehydrogenase can be used as a prognostic marker for preeclampsia and eclampsia.



## 1. Introduction

The pregnancy is physiological state associated with many alterations in metabolic, biochemical, physiological, hematological and immunological processes. If there are no

* *Corresponding author.*
*E-mail address*: vytlalavanya@gmail.com (Lavanya B).

https://doi.org/10.18231/j.ijogr.2022.016

complications, all these changes are reversible following a few days to a few months after delivery.[1] Pregnancy induced hypertension (PIH) is a common complication in pregnancy, affecting more than 5-10% pregnancies worldwide.[2]

The preeclampsia and eclampsia complicate 6–8% of all pregnancies and lead to various maternal and foetal complications. The PIH is associated with increased maternal morbidity and mortality. It can lead to complications like eclampsia, placental abruption, acute renal failure, pulmonary oedema in the mother. It is also associated with increased foetal complications like growth restriction, foetal distress, hypoxic ischaemic encephalopathy and it may sometimes lead to perinatal mortality.[3]

Lactate Dehydrogenase (LDH) is mainly an intracellular enzyme. It is responsible for the inter conversion of lactate to pyruvate in the cells. Its levels are several times greater inside the cells than in the plasma. Its levels are increased in the scenario of increased cell leakiness, hemolysis and cell death. PIH is associated with increased cell death and cell leakiness. Hence increased levels of LDH are often seen in PIH.[4–6]

The aim of the present study was to compare serum LDH levels in the normal pregnant women and pregnant women with preeclampsia and eclampsia in ante-partum period and to study the correlation of maternal and perinatal outcomes with serum LDH levels.

## 2. Materials and Methods

This was a prospective comparative study conducted in the department of Obstetrics and Gynecology in collaboration with the department of Biochemistry Navodaya Medical College, Raichur for one year.

Pregnant women were enrolled in this study in the third trimester of pregnancy and divided into following groups:

– Group 1—healthy normal pregnant women (controls)

– Group-2—patients of preeclampsia and eclampsia (subjects).

This was further subdivided into following subgroups

(a) Mild preeclampsia (b) Severe preeclampsia (c) Eclampsia

Subjects were also divided according to the serum LDH levels into following groups:-

1. <600 IU/l
2. 600–800 IU/l
3. >800 IU/l

### 2.1. Sample collection

Blood was collected aseptically for analysis of Serum LDH along with routine blood investigations. LDH levels was estimated in Erba biochemical fully automated analyzer by using Kinetic UV test.

All women were followed until delivery and early postpartum period and babies till early neonatal period.

### 2.2. Inclusion criteria

1. Any gravida
2. Pregnant women ≥20weeks of gestation.
3. Pregnant women between 18-35 years.
4. Singleton pregnancy.

### 2.3. Exclusion criteria

1. Pregnant women with essential hypertension or hypertension <20 weeks gestation
2. Pregnant women with preexisting diabetes mellitus, renal disease, liver disorder, hyperthyroidism, epilepsy, urinary tract infection, cardiovascular disease

### 2.4. Statistical analysis

All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean± standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries and diagrammatic presentation. Chi-square ($\chi^2$) test was used for association between two categorical variables.

## 3. Results

In the present study, a total of 200 pregnant women were included, out of which 100 were normal pregnant women which served as control group; remaining 34 (17%) cases were included in pregnancy with eclampsia and 66 (33%) were pregnancy with pre-eclampsia. Among pre-eclampsia cases, 25 (37.9%) were severe pre-eclampsia cases and 41 (62.1%) were mild eclampsia cases. The maximum number of patients in control group as well as in study group belonged to the age group of 20-24 years. There was no statistically significant difference between control and study group as for as age group is concerned.

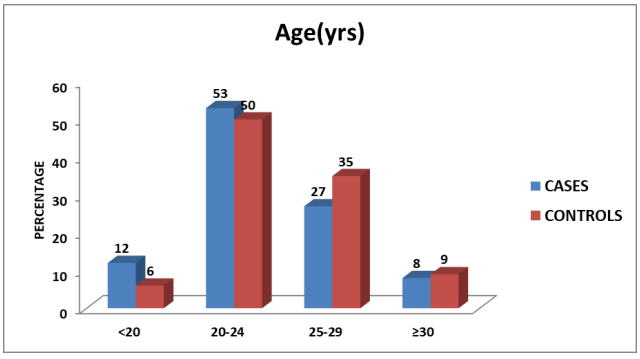


**Fig. 1:** Distribution of age between cases and controls

Among control group 94% of them had SBP <140 mmHg and 96% had DBP <90 mmHg. However, among study

**Table 1:** Distribution of SBP & DBP between cases and controls

| SBP (mmHg) | Cases | | Controls | | p value |
|---|---|---|---|---|---|
| | | % | | % | |
| <140 | 9 | 9 | 94 | 94 | <0.001* |
| 140-160 | 66 | 66 | 4 | 4 | |
| >160 | 25 | 25 | 2 | 2 | |
| Total | 100 | 100 | 100 | 100 | |
| **DBP (mmHg)** | | | | | |
| <90 | 13 | 13 | 96 | 96 | <0.001* |
| 90-110 | 81 | 81 | 4 | 4 | |
| >110 | 6 | 6 | 0 | 0 | |
| Total | 100 | 100 | 100 | 100 | |

Note: SBP –Systolic Blood Pressure
DBP – Diastolic Blood Pressure

**Table 2:** Distribution of Serum LDH among study group and control

| Serum LDH (IU/L) | Cases | | | | Control | p-value |
|---|---|---|---|---|---|---|
| | Mild Pre-eclampsia | Severe Pre-eclampsia | Eclampsia | Total Cases | | |
| <600 | 37 | 12 | 02 | 51 | 99 | <0.001 |
| 600-800 | 03 | 08 | 18 | 29 | - | |
| >800 | 01 | 05 | 14 | 20 | 01 | |
| Total | 41 | 25 | 34 | 100 | 100 | |

**Table 3:** Mean LDH between cases and controls

| Parameters | Cases | | Controls | | p value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| LDH(IU/l) | 570.5 | 270.9 | 201.9 | 125.9 | <0.001* |

**Table 4:** Mean LDH according to ecclampsia and severe pre eclampsia

| Parameters | Ecclampsia | | Severe pre eclampsia | | p value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| LDH(IU/l) | 725.0 | 226.1 | 565.5 | 301.1 | 0.221 |

**Table 5:** Perinatal outcome according to LDH

| Perinatal Outcome | LDH(IU/l)< 600 | | LDH(IU/l) 600 to 800 | | LDH(IU/l)> 800 | | p value |
|---|---|---|---|---|---|---|---|
| | | % | | % | | % | |
| FETAL DISTRESS | 3 | 5.9% | 0 | 0.0% | 0 | 0.0% | 0.585 |
| IUD | 1 | 2.0% | 0 | 0.0% | 0 | 0.0% | |
| IUGR | 4 | 7.8% | 1 | 3.4% | 3 | 15.0% | |
| LBW | 1 | 2.0% | 1 | 3.4% | 0 | 0.0% | |
| MSL | 1 | 2.0% | 0 | 0.0% | 0 | 0.0% | |
| Neonatal death | 2 | 3.9% | 0 | 0.0% | 1 | 5.0% | |
| Premature | 1 | 2.0% | 0 | 0.0% | 0 | 0.0% | |
| Still birth | 2 | 3.9% | 0 | 0.0% | 1 | 5.0% | |

group 66% had SBP were in the range of 140-160 mmHg and 81% had DBP range 90-110 mmHg. The difference between case and control were statistically significant in both systolic & diastolic group.

Out of 51 cases in study group with Serum LDH <600 IU/L, 37 (72.5%) cases showed mild pre-eclampsia and 12 (23.5%) cases showed severe Pre-eclampsia. In 29 cases of study group with Serum LDH in the range of 600-800 IU/L, 08 (27.6%) had severe pre-eclampsia and 18 (62.0%) had eclampsia. Of 34 eclampsia cases, 18(52.9%) had Serum LDH range 600-800IU/L and 14 (41.2%) had serum LDH >800IU/L. The mean Serum LDH in study group was 570.5 IU/L and in control group was 201.5 IU/L. The mean serum LDH in eclampsia cases was 725.0 IU/L and in pre-eclampsia 565.5 IU/L. However the difference of serum LDH between pre-eclampsia and eclampsia was statistically

insignificant (p value 0.22).

The perinatal outcome in serum LDH <600 IU/L was 7.8% IUGR, 5.9% fetal distress, and 3.9% neonatal death and still birth. In serum LDH range 600-800 IU/L, the perinatal outcome was 3.4% IUGR & LBW. In serum LDH >800 IU/L, 5% cases had IUGR and 15% had neonatal death and still birth. Though the LDH level was raised in eclampsia compared to severe pre-eclampsia, the difference was not statistically significant in perinatal outcome.

The maternal outcome in serum LDH <600 IU/L was 2% in abruption with PPH (post partum hemorrhage), DIC, eclampsia and PPH, with serum LDH between 600 & 800 IU/L was 6.9% PPH and with serum LDH >800 IU/L was 5% in PPH cases.

## 4. Discussion

Preeclampsia is an important disease of pregnancy with potentially severe consequences for mother and child. Severe preeclampsia can lead to grave complications like eclampsia, HELLP syndrome, abruption and even perinatal mortality and morbidity.

A study by Jaiswar SP et al. revealed that, out of these 107 cases 35 (32.7%) were mild preeclampsia, 36 (33.6%) were severe preeclampsia and 36 (33.6%) cases were of eclampsia. There was significant rise in the LDH levels with increasing severity of the disease.[7] The present study has also recorded the similar finding in the occurrence of preeclampsia and eclampsia ceses in the study group.

The occurrence of neonatal complications, stillbirths and perinatal deaths were significantly higher in mothers who had increased serum levels of LDH as per the findings of Jaiswar SP et al. Similarly, in our study the LDH levels were significantly elevated in women with preeclampsia and eclampsia & higher LDH levels had significant correlation with severity of the disease as well as poor maternal and perinatal outcome.[7]

As per the study by Amit D Sonagra et al, mean LDH levels in preeclampsia was 356.46±158.09, gestational hypertension 282.3±120.98, normal pregnancy 151.57±47.47 and controls 130.5±44.36.[8] In our study there is a statistically significance of mean serum LDH between control group (201.5 ± 125.9) and study group (570.5 ± 270.9). Another study by Umasatyasri et al assessed the prognostic significance of the values of serum LDH as a marker of preeclampsia – eclampsia and severity. They found Mean LDH levels in normotensive (n=50) 159.06 ± 41.93 Mild preeclampsia (n = 30) 323.30 ±77.40 Severe preeclampsia (n =20) 636.20 ± 132.29 Eclampsia (n = 50) 649.32 ± 153.53.[9]

A research work by Qublan et al revealed a significant association of serum LDH levels with severe preeclampsia. Increase in the incidence of perinatal deaths was also observed in patients with increasing levels of serum LDH levels. Intrauterine fetal death was seen in 4.8% of cases, intrauterine growth restriction in 33.9% and prematurity in 77.9%. Neonatal deaths were reported in 95.2% in severe preeclampsia group.[10] In our study, though there is significant association between increasing serum LDH and complications of eclampsia, neaonatal death and still birth were recorded only 15%. Another study conducted by Sreelatha S et al stated that the increased LDH level correlate with severity of PIH and has got poor perinatal outcome. So it can be considered as one of the biochemical marker.[11]

The study by Amit D Sonagra et al. concluded that Serum LDH gradually increase as the disease severity increases. Regular monitoring of serum LDH level in women with Hypertension in Pregnancy may give a clue of disease severity.[8]

In patients with higher LDH levels, vigilant monitoring and prompt management may decrease maternal and perinatal morbidity and mortality.[12] Serum LDH levels can be offered to all patients of preeclampsia and can be used to predict the prognosis of preeclampsia.[13]

The ability of clinicians to determine the high risk women and foetuses early in the course of illness would enable them to tailor individual management more effectively. Identifying women at risk for adverse outcomes would allow intensive monitoring or intervention and effective use of resources. Conversely, identifying women at low risk could decrease iatrogenic adverse maternal and neonatal outcomes by reducing unnecessary intervention and monitoring. In future, the study with larger sample size would further validate the data of the present work.

## 5. Source of Funding

None.

## 6. Conflict of Interest

The authors declare no conflict of interest.

## References

1. Cunningham F, Lenevo K, Bloom S, Hauth J, Gilstrap L. Maternal physiology. In: Williams Obstetrics. New York: Mc Graw Hill; 2011. p. 107–31.
2. Lo JO, Mission JF, Caughey AB. Hypertensive disease of pregnancy and maternal mortality. *Curr Opin Obstet Gynecol*. 2013;25(2):124–32.
3. Bhawna MS. Hypertensive disorders. In: Renu M, editor. Ian Donald's Practical obstetric problems. New Delhi: BI Publication; 2007. p. 166–7.
4. Vasudevan D, Sreekumari S, Vaidyanathan K. Clinical enzymology and biomarkers. In: and others, editor. Textbook of biochemistry. New Delhi: Jaypee Brothers; 2011. p. 146–59.
5. Kumar S, Bansal D, Hota D, Jain M, Singh P, Pandey BL. Assessment of clinical outcomes and prescribing behavior among inpatients with severe preeclampsia and eclampsia: An Indian experience. *Indian J Pharmacol*. 2014;46(1):18–23.
6. Pannu D, Das B, Hazari SP. Maternal and perinatal outcome in eclampsia and factors affecting the outcome: a study in North Indian population. *Contracept Obstet Gynecol*. 2014;3(2):347–51.

7. Jaiswar SP, Gupta A, Sachan R, Natu SN, Shaili M. Lactic dehydrogenase: a biochemical marker for preeclampsia-eclampsia. *J Obstet Gynecol India*. 2011;61(6):645–8.
8. Sonagra AD, Dattatreya K, Murthy JD. Serum LDH, ALP and Uric Acid in hypertensive disorders of pregnancy. *Int J Pharm Bio Sci*. 2012;2(3):201–9.
9. Umasatyasri Y, Van I, Shamita P. Role of LDH (Lactate dehydrogenase) in preeclampsia eclampsia as a prognostic marker: An observational study. *IAIM*. 2015;2(9):88–93.
10. Qublan H, Ammarin V, Bataineh O, Al-Shraideh Z, Tahat Y, Awamleh I. Lactic dehydrogenase as a biochemical marker of adverse pregnancy outcome in severe pre- eclampsia. *Med SciMonit*. 2005;11(8):393–7.
11. Sreelatha S, Bharathi A, Ramya S, Shwetha S. Estimation of serum LDH and uric acid in preeclampsia and its correlation with Maternal and Perinatal outcome in preeclampsia. *Int J Adv Case Rep*. 2015;2(7):447–9.
12. Kozic JR, Benton SJ, Hutcheon JA, Payne BA, Magee LA, Dadelszen PV. Abnormal liver function tests as predictors of adverse maternal outcomes in women with preeclampsia. *J Obstet Gynaecol Canada*. 2011;33(10):995–1004.
13. Gandhi M, Chavda R, Saini HB. Comparative study of serum LDH and uric acid in hypertensive versus normotensive pregnant woman. *Int J Biomed Res*. 2015;6(1):25–8.

## Author biography

**Lavanya B,** Associate Professor

**Rashmi Ullagaddi,** Senior Resident

**Pavani M,** Assistant Professor

**K Srinivas Rao,** Professor

**Cite this article:** Lavanya B, Ullagaddi R, Pavani M, Rao KS. Evaluation of serum lactate dehydrogenase as early diagnostic biomarker in pregnancy with preeclampsia and eclampsia. *Indian J Obstet Gynecol Res* 2022;9(1):83-87.